

CLAIMS

What is claimed is:

1. An apparatus for dual pass adaptive tessellation comprising:

a vertex grouper tessellator operably coupled to receive primitive information and an index list, wherein the index list is received from a memory device;

a shader processing unit coupled to the vertex grouper tessellator, wherein during a first pass, the shader processing unit receives primitive indices and an auto-index value for each of the plurality of primitive indices;

a plurality of vertex shader input staging registers operably coupled to the shader processing unit, each of the plurality of vertex shaders input staging registers coupled to one of a plurality of vertex shaders such that in response to a shader sequence output, the vertex shaders generate tessellation factors; and

the tessellation factors are provided to the vertex grouper tessellator such that the vertex grouper tessellator generates a per process vector output, a per primitive output and a per packet output.

2. The apparatus of claim 1 further comprising:

the tessellation factors provided from the plurality of vertex shaders to a memory such that the memory device may provide the tessellation factors to the vertex grouper tessellator.

3. The apparatus of claim 1 further comprising:

a plurality of coordinates generated by the tessellator in vertex grouper tessellator in response to the tessellation factor.

4. The apparatus of claim 3 wherein the plurality of coordinates are at least one of:
barycentric coordinates and tensor coordinates.
5. The apparatus of claim 3 further comprising:
a plurality of tessellated vertices generated by the plurality of vertex shaders in response
to a plurality of control points and the plurality of coordinates.
6. The apparatus of claim 1 further comprising a plurality of control points for higher
order surfaces generated by the plurality of vertex shaders based on a plurality of corner vertices
of a plurality of primitives.

7. An apparatus for dual pass adaptive tessellation comprising:
 - a vertex grouper-tessellator operably coupled to receive primitive information and a vertex index list from a memory device;
 - a shader processing unit coupled to the vertex grouper tessellator, wherein during a first pass, the shader processing unit receives primitive indices and an auto-index value for each of the plurality of primitive indices;
 - a math processing unit coupled to the vertex grouper-tessellator, the math processing unit including a plurality of input staging registers and a plurality of arithmetic logic units;
 - a control flow processor operatively coupled to the math processing unit wherein the control flow processor drives the math processing unit; the memory device operably coupled to the plurality of vertex shaders such that the tessellation factors are stored therein; and
 - the vertex grouper tessellator retrieves the tessellation factors in second pass such that the vertex grouper tessellator generates a per process vector output, a per primitive output and a per packet output.
8. The apparatus of claim 7 further comprising:
 - a plurality of coordinates generated by the vertex grouper tessellator in the second pass in response to the tessellation factor.
9. The apparatus of claim 8 wherein the plurality of coordinates are at least one of:
barycentric coordinates and tensor coordinates.
10. The apparatus of claim 8 further comprising:

a plurality of tessellated vertices generated by the plurality of vertex shaders in response to a plurality of control points and the plurality of coordinates.

11. The apparatus of claim 7 further comprising a plurality of control points for higher order surfaces generated by the plurality of vertex shaders based on a plurality of corner vertices of a plurality of primitives.

12. A method for dual pass adaptive tessellation comprising:
- in a first pass:
- receiving primitive information and an index list, wherein the index list is received from a memory device;
 - generating primitive indices from the primitive information and an auto-index value for each of the primitive indices;
 - generating a plurality of shader sequence outputs;
 - providing the shader sequence outputs to a plurality of vertex shader input staging registers;
 - generating a plurality of tessellation factors in response to the shader sequence outputs; and
- in a second pass:
- receiving the tessellation factors as a plurality of indices.
13. The method of claim 12 further comprising:
- during the second pass:
- generating an auto-index value for each of the plurality of indices;
 - generating a plurality of bary-centric coordinates based on the tessellation factors;
 - and
 - computing a plurality of tessellated vertices by fetching a control point specified by the auto-index value for each of the plurality of indices.
14. The method of claim 13 wherein the coordinates are at least one of bary-centric coordinates and tensor coordinates.
15. The method 12 further comprising:

providing the shader sequence outputs to a plurality of vertex shaders which are operably coupled to the vertex shader input staging registers.

16. The method of claim 12 further comprising:

prior to the second pass, writing the plurality of tessellation factors to a memory device;

and

during the second pass, receiving the tessellation factors from the memory device.

17. The method of claim 16 wherein the tessellation factors are received from the memory device using a direct memory access.

18. A method for dual pass adaptive tessellation comprising:

in a first pass:

receiving vertex information and an index list, wherein the index list is received from a memory device;

generating primitive indices from the primitive information and an auto-index value for each set of the primitive indices;

generating a plurality of shader sequence outputs;

providing the shader sequence outputs to a plurality of vertex shader input staging registers:

generating a plurality of tessellation factors in response to the shader sequence outputs; and

in a second pass:

receiving the tessellation factors as a plurality of indices;

generating an auto-index value for each of the plurality of indices;

generating a plurality of bary-centric coordinates based on the tessellation factors;; and

computing a plurality of tessellated vertices by fetching a control point specified by the auto-index value for each of the plurality of indices.

19. The method 18 further comprising:

providing the shader sequence outputs to a plurality of vertex shaders which are operably coupled to the vertex shader input staging registers.

20. The method of claim 18 further comprising:

prior to the second pass, writing the plurality of tessellation factors to a memory device;

and

during the second pass, receiving the tessellation factors from the memory device.

21. A method for dual pass adaptive tessellation comprising:

in a first pass:

receiving vertex information and an index list, wherein the index list is received
from a memory device;
generating primitive indices from the primitive information and an auto-index
value for each set of the primitive indices;
generating a plurality of shader sequence outputs;
providing the shader sequence outputs to a plurality of vertex shader input staging
registers;
generating a plurality of tessellation factors in response to the shader sequence
outputs; and

in a second pass:

receiving the tessellation factors as a plurality of indices;
receiving a primitive type indicator; and
generating a set of coordinates based on the plurality of indices and the primitive
type indicator.

22. The method of claim 21 further comprising:

during the second pass:

generating an auto-index value for each of the plurality of indices;
generating a plurality of bary-centric coordinates based on the tessellation
factors;; and
computing a plurality of tessellated vertices by fetching a control point specified
by the auto-index value for each of the plurality of indices.

23. The method of claim 21 further comprising:

receiving a vertex reuse number; and

generating a plurality of vertices based on the vertex reuse number.

24. The method of claim 21 wherein the set of coordinates are parametric coordinates when the vertices define a plurality of tensor product surfaces and the set of coordinates are barycentric coordinates when the vertices define a plurality of triangular surfaces.

25. The method 21 further comprising:

generating a plurality of sub-primitive vertices information.